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Indian Standard

SPECIFICATION FOR HIGH-FIDELITY AUDIO EQUIPMENT AND SYSTEMS

PART IV RECORD PLAYING EQUIPMENT

UDC 681·844

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INDIAN STANDARDS INSTITUTION
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SPECIFICATION FOR HIGH-FIDELITY AUDIO EQUIPMENT AND SYSTEMS

PART IV RECORD PLAYING EQUIPMENT

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SPECIFICATION FOR HIGH-FIDELITY AUDIO EQUIPMENT AND SYSTEMS

PART IV RECORD PLAYING EQUIPMENT

0. FOREWORD

0.1 This Indian Standard (Part IV) was adopted by the Indian Standards Institution on 25 September 1980, after the draft finalized by the Recording Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 This standard covers the performance requirements for disk record playing units intended for high fidelity reproducing systems for home use.

0.2.1 The characteristics amplitude non-linearity and non-linear distortion have been kept under consideration till complete information is available as to their methods of measurement and performance requirements.

0.3 Other standards of this series consist of the following parts:

Part I : General
Part II : Amplifier
Part III : Loudspeaker
Part V : Magnetic sound tape recording and reproducing equipment.

0.4 While preparing this standard, assistance has been derived from the following:

IEC Publication 581-3 — High fidelity audio equipment and systems. Minimum performance requirements : Part 3 Record playing equipment and cartridges. International Electrotechnical Commission.

DIN : 45500 (Blatt 3) — High fidelity techniques. Minimum requirements for record playing equipment. Deutscher Normenausschuss.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part IV) specifies the performance requirements for disk record playing units, comprising the drive system for the record and the reproducing pick-up system, and intended for high fidelity reproducing systems for home use.

2. TERMINOLOGY

2.1 For the purpose of this standard, the terms and definitions covered in IS : 1885 (Part XLVIII/Sec 2)-1978*, IS : 9729† and IS : 9272 (Part I)-1979‡ shall apply.

3. GENERAL CONDITIONS FOR MEASUREMENT

3.1 Provision of **3** of IS : 9729† shall apply.

4. DESIGN AND CONSTRUCTION

4.1 Provision of **3** of IS : 9272 (Part I)-1979‡ and **3** of IS : 9272 (Part II)-1979§ shall apply.

5. DISK RECORDS

5.1 The unit shall be capable of handling all disk records conforming to IS : 9305-1979||.

6. INDICATORS, CONTROLS AND OTHER COMPONENT PARTS

6.1 Provision of **5** of IS : 9272 (Part I)-1979‡ and **4** of IS : 9272 (Part II) 1979§ shall apply.

7. POWER SUPPLY

7.1 Provision of **6** of IS : 9272 (Part I)-1979‡ shall apply.

8. SAFETY

8.1 The equipment shall conform to the requirements specified in IS : 616-1957¶ so far as mains operation is concerned.

9. COLOUR CODING

9.1 Provisions of **9** of IS : 9272 (Part I)-1979‡ shall apply.

10. MARKING

10.1 Provisions of **10** of IS : 9272 (Part I)-1979‡ and **9** of IS : 9272 (Part II)-1979§ and IS : 9551 (Part I)** shall apply.

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*Electrotechnical vocabulary : Part XLVIII Recording, Sec 2 Disk recording [Superseding IS : 1885 (Part III/Sec 3)-1967].

†Methods of measurement on disk record playing equipment (*under preparation*).

‡Specification for disk record playing equipment : Part I Record player.

§Specification for disk record playing equipment : Part II Amplifiers and Loudspeakers.

||Specification for processed disk records.

¶Code of safety requirements for mains-operated radio receivers.

**Specification for high fidelity audio equipment and systems : Part I General (*under preparation*).

11. OPERATING AND INSTRUCTIONS MANUAL

11.1 This manual shall contain operating, maintenance and any other special instructions required for long operating life of the equipment. Service manual containing a list of parts, spares and accessories and circuit diagram shall be supplied on request.

12. TEST DATA

12.1 Each equipment should be tested by the maufacturer and the test data should be supplied with the equipment.

13. TESTS

13.1 Classifications of Tests

13.1.1 *Type Tests* — The tests specified in Table 1 shall constitute type tests and shall be carried out in the same sequence in which they appear in Table 1.

13.1.1.1 *Number of samples* — The number of samples shall be one disk record playing equipment of the same model, type and rating (selected preferably at random from a regular production lot).

13.1.1.2 *Criteria of acceptance* — There shall be no single failure in any of the type tests.

13.1.2 *Acceptance Tests* — The acceptance tests shall be carried out on a limited number of samples selected in accordance with the sampling procedure given in Appendix A, and which have passed routine tests. The samples shall be subjected to the following tests in the order given below:

a) Mean deviation from rated speed,
b) Wow and flutter (weighted),
c) Weighted signal to rumble ratio,
d) Effective frequency range,
e) Non-linear distortion,
f) Rated output voltage (channel sensitivity at 1 000 Hz), and
g) Static vertical stylus force.

13.1.3 *Routine Tests* — The following tests shall be conducted on each equipment:

a) Visual examination,
b) Operational test, and
c) Rated output voltage (channel sensitivity at 1 000 Hz).

13.2 Performance Requirements — The performance requirements shall be as specified in Table 1.

TABLE 1 TEST SCHEDULE

(*Clauses* 13.1.1 *and* 13.2)

SL No.	CHARACTERISTIC	METHOD OF MEASUREMENT (CLAUSE REF OF IS : 9729*)	REQUIREMENT
(1)	(2)	(3)	(4)
1.	Visual examination	**5.1**	—
2.	Operational test	**5.2**	—
3.	Mean deviation from rated speed	**5.4**	± 1·5 percent to −1 percent at any power supply voltage within the range ±10 percent of the rated supply voltage
4.	Weighted wow and flutter	**5.5** NOTE — Though the meter measures peak-to-peak values, the reading indicates wow as percentage of the figure corresponding to one half the peak-to-peak value. The weighting network used is specified in IS : 8152-1976†.	*Max* wow and flutter shall be ±0·2 percent
5.	Unweighted reference signal-to-rumble ratio	**5.6** This is given as: $20 \log \frac{U_O}{U}$ dB where U_O = voltage derived from the reference signal U = voltage derived from the low-frequency vibration	$\geqslant$ 35 dB Reference velocity 3·83 cm/s rms Reference frequency 315 Hz

6. Weighted reference signal-to-rumble ratio	**3.6** This is given as: $$20 \log \frac{U_O}{U} \text{dB}$$ where U_O = voltage derived from the reference signal U = voltage derived from the low frequency vibration NOTE — The weighting network used is specified in IS : 8152-1976†.	$\geqslant$ 55 dB Reference velocity 3·83 cm/rms. Reference frequency 315 Hz
7. Reference signal-to-hum ratio	**5.7** This is given as: $$20 \log \frac{U_O}{U} \text{dB}$$ where U_O = voltage derived from the reference signal U = maximum voltage derived from the stray fields	$\geqslant$ 50 dB Reference velocity 3·83 cm/s rms. Reference frequency 315 Hz
8. Channel unbalance	**5.9** This is given as: $$20 \log \left\lvert \frac{U_R}{U_L} \right\rvert \text{dB}$$ where U_L = left output voltage derived from left 1 000 Hz signal U_R = right output voltage derived from identical right 1 000 Hz signal	$\leqslant$ 2 dB

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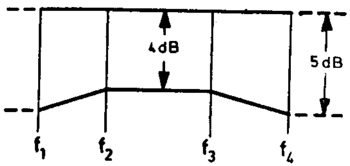
*Methods of measurement on disk record playing equipment (*under preparation*).

†Methods of measurement of speed fluctuations in sound recording and reproducing equipment.

(*Continued*)

TABLE 1 TEST SCHEDULE — *Contd*

SL No.	CHARACTERISTIC	METHOD OF MEASUREMENT (CLAUSE REF OF IS: 9729*)	REQUIREMENT
(1)	(2)	(3)	(4)
9.	Channel separation NOTE — This is in most cases equivalent to 'cross-talk between channels'.	5.10 This is given as: Separation of channel L from channel R: $20 \log \frac{(U_L)_L}{(U_L)_R}$ dB Separation of channel R from channel L: $20 \log \frac{(U_R)_R}{(U_R)_L}$ dB where $(U_L)_L$ = output voltage of channel L $(U_L)_R$ = output voltage of channel L due to input voltage applied to channel R $(U_R)_R$ = output voltage of channel R $(U_R)_L$ = output voltage of channel R due to input voltage applied to channel L NOTE — Separation and cross-talk are equivalent only if $(U_L)_L = (U_R)_R$	> 20 dB at 1 000 Hz > 15 dB between 315 Hz and 6 300 Hz for two channels NOTE — The requirements for multi-channel equipment are under consideration.

10. Effective frequency range	**5.11.1** If the claimed effective frequency range is wider than the minimum requirement of 40 Hz and 12 500 Hz the tolerance of 5 dB still applies	From 40 Hz to 12 500 Hz within the tolerances defined by the graph:  f_1 = 40 Hz f_3 = 8 000 Hz f_2 = 63 Hz f_4 = 12 5000 Hz
11. Tracking ability	**5.12**	The force required to track the test record shall not exceed 0·03 N.
12. Rated output voltage	**5.8** (Both voltage and velocity are rms values) This is given as: $\frac{U}{v}$ mV per cm/s where U is the output voltage at velocity v, U and v are both either rms or peak values	Velocity sensitive pick-ups: 0·7 to 2·0 mV/cm/s. NOTE — For electrodynamic pick-ups it will be necessary to provide built-in amplification.
13. Vertical tracking angle	—	20±5°
14. Static vertical stylus force†	—	Maximum 0·03 N.

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*Methods of measurement on disk record playing equipment (*under preparation*).

†Stylus force, resilience, stylus radius and effective stylus weight are characteristics closely related to each other. The values must therefore match each other properly, the tolerances cannot be fully used up in any arbitrary manner.

(*Continued*)

TABLE 1 TEST SCHEDUE — *Contd*

Sl No.	Characteristic	Method of Measurement (Clause Ref of IS : 9729*)	Requirement
(1)	(2)	(3)	(4)
15.	Compliance†	—	Compliance in each direction, measured statually, shall be at least 0·8 cm/N corresponding to a maximum restoring force of $7{\cdot}5 \times 10^{-3}$ N measured at 60 µm deflection. Compliance in the horizontal direction shall be greater than in the vertical direction.
16.	Stylus tip radii†	**8.1.1** of IS : 9272 (Part I)-1979‡	Spherical stylus: 15 + 3 µm Non-spherical stylus: 18 + 3 µm and 6 ± 2 m.
17.	Effective stylus weight†	—	The maximum effective weight, referred te the stylus tip shall be 2 mg.
18.	Environmental tests	**13.3** of this standard.	The following tests shall be carried out after the environmental tests and shall meet the corresponding requirements specified in this standard: a) Operational test, b) Mean deviation from rated speed, c) Tracking ability, d) Vertical tracking angle, e) Static vertical stylus force, f) Wow and flutter, and g) Rated output voltage.

*Methods of measurement on disk record playing equipment (*under preparation*).

†Stylus force, resilience, stylus radius and effective stylus weight are characteristics closely related to each other. The values must therefore match each other properly, the tolerances cannot be fully used up in any arbitrary manner.

‡Specification for disk record playing equipment: Part I Record players.

13.3 Environmental Tests

13.3.1 *Climatic Sequence Test*

13.3.1.1 *Dry heat* — This test shall be carried out at a temperature of 40°C and duration of 96 hours in accordance with IS : 9000 (Part III/ Sec 5)-1977*.

13.3.1.2 *Damp heat* (*first cycle*) — The first cycle shall be carried out in accordance with IS : 2106 (Part II)-1962†.

13.3.1.3 *Cold* — This test shall be carried out at a temperature of —10°C and duration of 16 hours in accordance with IS : 9000 (Part II)-1977‡.

13.3.1.4 *Damp heat* (*second cycle*) — The second cycle shall be carried out in accordance with IS : 2106 (Part II)-1962† after a recovery period of 24 hours.

13.3.2 *Bump Test* — This test shall be carried out in accordance with IS : 9000 (Part VII/Sec 2)-1979§ with 4 000 bumps with an acceleration of 400 ± 40 m/sec^2.

13.3.3 *Drop Test* — This test shall be conducted in accordance with **9.2** of IS : 9000 (Part VII/Sec 3)-1978||. The height of drop being 25 mm.

13.3.4 *Vibration Test* — This test shall be conducted in accordance with IS : 2106 (Part XVI)-1971¶.

Frequency range = 10-150 Hz
Amplitude = 0·15 mm or 2g
Duration = 6 hours.

13.3.5 *Dust Test* — This test shall be carried out in accordance with IS : 2106 (Part XII)-1965**.

13.3.6 *Salt Mist Test* — This test shall be carried out in accordance with IS : 2106 (Part XVIII)-1973††.

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*Basic environmental testing procedures for electronic and electrical items: Part III Dry heat test, Section 5 Dry heat test for heat dissipating items with gradual change of temperature.

†Environmental tests for electronic and electrical equipment Part II Damp heat (cycling) test.

‡Basic environmental testing procedures for electronic and electrical items : Part II Cold test.

§Basic environmental testing procedures for electronic and electrical items: Part VII Impact test, Section 2 Bump.

||Basic environmental testing procedures for electronic and electrical items: Part VII Impact test, Section 3 Drop and topple.

¶Environmental tests for electronic and electrical equipment : Part XVI Vibration test.

**Environmental tests for electronic and electrical equipment : Part XII Dust test.

††Environmental tests for electronic and electrical equipment : Part XVIII Salt mist test.

APPENDIX A

(*Clause* 13.1.2)

SAMPLING AND CRITERIA FOR CONFORMITY

A-1. LOT

A-1.1 All the disk record playing equipments of the same model and type having the same design and manufactured by the same technique under eventually similar conditions of production shall constitute a lot.

A-1.1.1 Samples shall be taken and tested to ascertain the conformity of each lot for acceptance tests.

A-2. SCALE OF SAMPLING

A-2.1 Disk record playing equipment shall be taken at random according to Table 2 (*see* IS : 4905-1968*).

TABLE 2 SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

Lot Size (N)	First Sample (N_1)	Second Sample (N_2)	Combined Sample (N_1+N_2)	Acceptance Number	Rejection Number
(1)	(2)	(3)	(4)	(5)	(6)
Up to 150	5	5	10	0	2
151 to 300	8	8	16	0	2
301 and above	13	13	26	0	2

A-3. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-3.1 Disk record playing equipments shall be drawn from each lot according to col 1 and 2 of Table 2 and subjected to the acceptance tests specified in **13.1.2.** If an equipment fails in any one of the acceptance tests, it shall be called as defective. If the number of defectives found in the first sample (*see* col 3) is zero (*see* col 5), the lot shall be considered as conforming to the acceptance tests. If the number of defectives is as equal to or greater than two (*see* col 6), the lot shall be considered as not conforming to the acceptance tests.

A-3.1.1 If the number of defectives is equal to one, further sample of equipment shall be taken as specified in col 3 of Table 2 and tested for all the acceptance tests. If the number of defectives in the combined sample (*see* col 4), is less than two (*see* col 6), the lot shall be considered as conforming to the acceptance tests otherwise rejected.

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*Methods for random sampling.